3:15

896-6 Long-term Normalization of the Absolute and Relative Coronary Flow Reserve After Balloon Angioplasty and Stent Implantation

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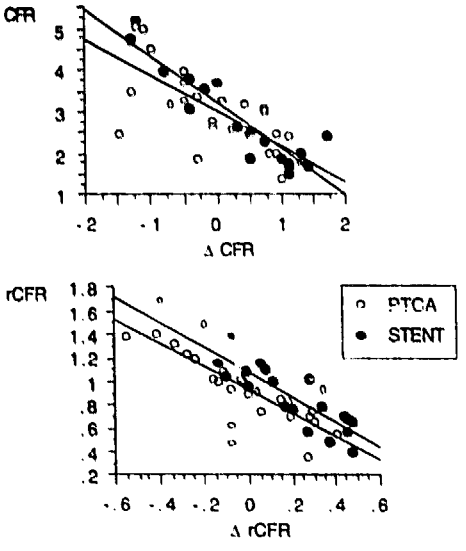
Background: Coronary flow reserve immediately after balloon angioplasty normalizes towards reference values during follow-up due to A) coronary artery remodeling and/or B) adaption of the microvascular circulatory system. We evaluated the influence of remodeling on the long-term response of the absolute (CFR) and relative (rCFR) flow velocity reserve after balloon angioplasty or stent placement.

Methods: We studied patients with 1-vessel disease and normal left ventricular function directly after successful balloon angioplasty or stent-implantation and at 6 months follow-up. CFR was determined distal of the treated lesion using a 0.014" Doppler guide wire. The rCFR was defined as the ratio between the CFR and the CFR of the normal reference coronary artery. Patients with restenosis at late follow-up (%DS >50%) were excluded from further analysis.

Results: In 27 patients treated with balloon angioplasty and without restenosis CFR and rCFR remained unchanged at follow-up (3.0 ± 0.7 and 0.97 ± 0.16). In 19 patients treated with stent placement and without restenosis, the dCFR and rCFR increased during follow-up from 2.8 ± 1.1 to 3.2 ± 0.8 and 0.87 ± 0.24 to 1.07 ± 0.14 respectively (both P < 0.001). Stepwise regression analysis revealed the CFR and rCFR immediately after treatment as the strongest independent predictors for the alterations of the CFR (ΔCFR) and rCFR (ΔrCFR) during follow-up. In both patient groups high values decrease and low values increase at follow-up towards normal reference values (Figure). There was no difference between the regression lines of balloon-treated and stent-treated patients (Figure).



Conclusion: Long-term normalization of the CFR is rather due to adaption of the microvascular circulation than to remodeling of the treated epicardial coronary segment.

897 Pacing for Hemodynamic Benefit in Heart Failure

Wednesday, April 1, 1998, 2:00 p.m.–3:30 p.m.
Georgia World Congress Center, Room 254W

2:00

897-1 Multi-Site Ventricular Pacing Increases Cardiac Output Compared With Right Ventricular Apical Pacing in Dogs With Heart Failure

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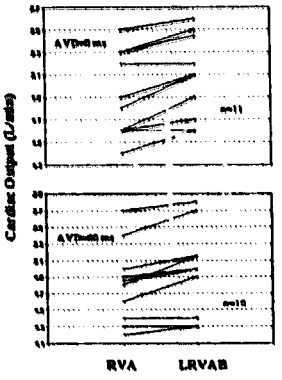
Background: We have previously demonstrated that cardiac function is improved by multi-site pacing in the ventricles compared with right ventricular apical (RVA) pacing in a normal heart. This study was designed to investigate the effects of multi-site ventricular pacing on cardiac function in dogs with heart failure.

Methods and Results: Cardiac output (CO) and cardiac contractility (CT) were studied in isoflurone-anesthetized dogs with heart failure induced by rapid RVA pacing (240 bpm) for 3–4 weeks. CO was measured using a continuous cardiac output computer (Baxter). dp/dt_{Max} derived from left ventricular pressure (Millar) was used as an index of CT. Unipolar intramyocardial electrodes were placed at high right atrium and the apex (A) and base (B) of the left (L) and right (R) ventricles (V). These different ventricular sites, singly or in combination, were randomly paced at four times diastolic pacing threshold with an AV delay of 0 and 60 ms. Pacing cycle length was 30–50 ms shorter than sinus cycle length. CO and CT were measured after pacing for 5–20 min. CO was greater during 4-site ventricular pacing (LRVAB) than any single ventricular site pacing. Compared with RVA pacing, CO increased by 8.5% ($p < 0.01$) during LRVAB pacing with an AV delay of both 0 and 60 ms (figures). CT was 23.5% ($p < 0.001$) and 9.6% ($p < 0.001$) greater during LRVAB pacing than during RVA pacing with an AV delay of 0 and 60 ms, respectively.



Conclusions: We conclude that multi-site ventricular pacing improved cardiac function more than RVA pacing both with and without sequential AV contraction in a heart failure animal model.

2:15

897-2 Implications of Long-term Pacemaker Holter Monitoring of Patients With Terminal Heart Failure Submitted for Heart Transplantation

H. Nägele, U. Appl, W. Rödiger. *Dpt. of Cardiac Surgery, University Hamburg, Germany*

Background: Sudden death is the major terminal event in status II pts. with severe cardiac failure submitted for heart transplantation (HTx). There are conflicting reports on the responsible rhythm disturbance (bradycardic or tachycardic) and no accepted prophylactic measure exists.

Methods: In 72 HTx candidates (mean age 49.2 years, mean LVEF 23.1%, dilated cardiomyopathy 47%) DDD pacemakers were implanted for diagnostic purposes. In the RAM of each pacemaker a brady- and tachycardia monitoring program (MARK 1 a) was loaded to detect either pauses >2000 ms or fast rhythms with a cycle length of <350 ms on at least 3 consecutive beats. For each event marker channels were available to define the rhythm disturbance more precisely. Back-up pacing was delivered at a basal rate of 30 bpm. Prophylactic amiodarone was given in 93% and additional carvedilol was given in 72% of the pts. Pacemakers holters were interrogated every 3 months.

Results: Mean follow-up time was 0.72 +- 0.7 years. Significant bradycardic and tachycardic events were detected as shown in the table. 3 patients died suddenly and had holter analysis postmortem. 2 of these 3 patients had preceding complex ventricular tachycardias in the weeks before the terminal event.

	Sinus-arrest	Total AV block	SVT >167 bpm	VT >167 bpm
Incidence	7%	12.5%	5.3%	46%
Number of episodes/pt /3 month	10	10.3	121	11.6
Mean duration of episodes (sec)	5.7	5.2	8.3	2.77

Conclusion: Our results show both the occurrence of significant bradycardic and tachycardic events in status II patients submitted for heart transplantation. Antibradycardic back-up pacing may be helpful in approximately 20% of the patients were intermittent SA and AV blocks were found and bradycardic arrest can be suspected. Furthermore repeated pacemaker holter analysis may detect patients at high risk for tachycardic arrest for further processing to prophylactic ICD implantation.